Installation, Operation and Maintenance Manual

Donaldson® Torit® DCE®

PowerCore® Dust Collectors

Series CPV

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Donaldson reserve the right to alter design without notice. Freedom from patent restrictions must not be assumed.

'MASTER' LANGUAGE

Donaldson®

IMPORTANT

PLEASE READ THIS MANUAL CAREFULLY BEFORE INSTALLATION.

THIS MANUAL SHOULD BE READ IN CONJUNCTION WITH THE CONTROLLER MANUAL, PUBLICATION 2699, SUPPLIED WITH THE DUST COLLECTOR.

PRODUCT RELIABILITY, WARRANTY AND SAFE OPERATION MAY BE COMPROMISED BY NOT FOLLOWING THE GUIDANCE GIVEN IN THESE DOCUMENTS.

EXPLANATION OF SYMBOLS USED

Indicates information on the efficient operation of the collector.

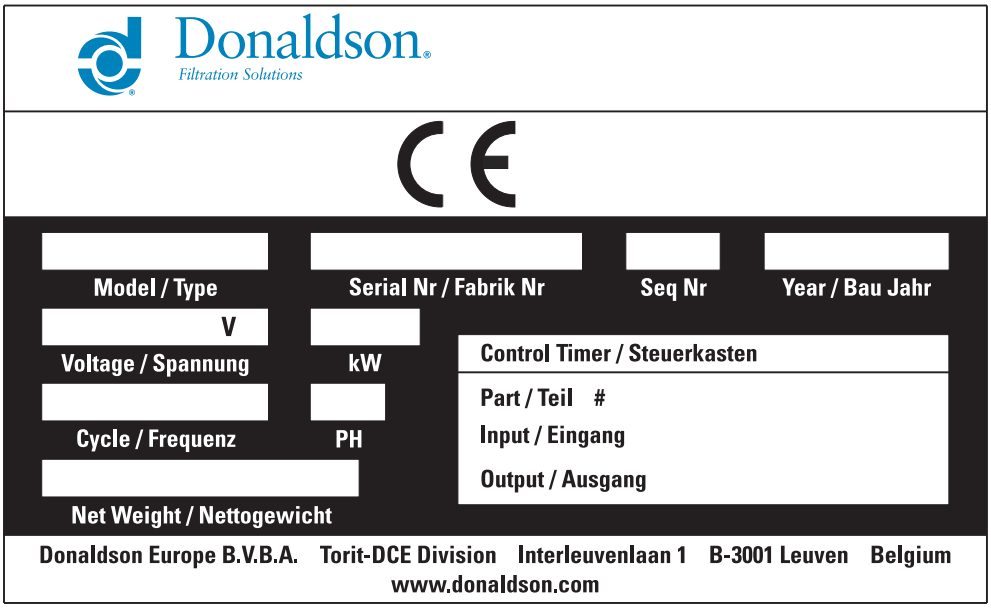
Indicates important information directed towards preventing damage.

Indicates an important warning, designed to prevent injury or extensive damage.

IMPORTANT

Improper operation of a dust control system may contribute to conditions in the work area or facility that could result in severe personal injury and product or property damage. Check that all collection equipment is properly selected, sized and operated for the intended use.

These details correspond to the serial nameplate
located on the right-hand side panel of the equipment



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GENERAL SAFETY REQUIREMENTS

The dust collector should be used only when it is in a technically acceptable condition. Regular maintenance, as set out in this manual, is required to minimise technical failure. Third party supplied components (for example motors) should be maintained according to the manufacturer's instructions.

You should ensure any persons carrying out work on the supplied equipment follow any relevant recognised standards/codes and are competent to do so. Areas requiring a competent person include:

- Maintenance on any component identified as a potential ignition source.
- Lifting and erection.
- Electrical installation, inspection and maintenance work.
- Pneumatic installation, inspection and maintenance work.
- Any access to internal classified potentially explosive atmospheres where there may be a risk due to explosion.

During assembly/installation or dismantling of equipment, potential ignition sources may occur that were not considered in the risk assessment of the unit in operation (for example, grinding, welding sparks, etc.)

You should use the dust collector in full accordance with the conditions set out in the Order Acknowledgment and relevant Scope of Delivery. Failure to do so may compromise product reliability, warranty and safety. The Scope of Delivery is an integral part of the manual.

Other items of equipment, not supplied under the Scope of Delivery from Donaldson, should be installed, operated and maintained according to the documentation supplied with the respective equipment.

Any modification carried out on the 'as supplied' equipment may reduce reliability and safety, and will nullify warranty; such actions fall outside the responsibility of the original supplier.

Where necessary for safety, the dust collector is fitted with fixed guards. Removal of these guards and any subsequent work should only be carried out after adequate precaution is taken to ensure it is safe to do so. All guards should be refitted before re-energising.

GENERAL SAFETY REQUIREMENTS

Compressed air is recommended for collectors that operate using reverse jet cleaning. Alternative gases should be assessed before use to ensure that explosive atmospheres are not introduced during media cleaning.

Where the equipment supplied is suitable for working within a potentially explosive atmosphere (as defined by Directive 94/9/EC) it will be according to the categories and conditions marked on the collector serial nameplate. You should ensure the equipment supplied by others is also suitable. If no marking is given on the serial nameplate then the supplied equipment is not suitable for use in potentially explosive atmospheres.

Care should be taken to ensure that any potentially explosive atmosphere is not present when performing operations that increase the risk of ignition (opening of controller for adjustment or electrical repair for example). Ensure the installation is always returned to its original state.

Where the dust being processed can ignite due to exothermic reaction, including self ignition, the installation MUST be fitted with a suitable explosion protection method (venting for example). The risk of ignition can be minimised by avoiding the accumulation of dust layers with regular cleaning.

Precautions, as set out in the Scope of Delivery, are used to minimise the risk of ignition of any dust clouds contained within the dust collector. The possibility of other ignition sources being introduced into the collector during periods where any dust cloud may be present should be minimised. Particular care should be taken to avoid introducing glowing particles via the inlet ducting.

Where applicable, equipment connected to the dust collector (for example, a cyclone) should be protected, using suitable isolation devices, against the transfer of flame and pressure if, in the event of an explosion initiating inside the dust collector, the connected equipment is not capable of safely withstanding these effects.

It may be necessary to provide a facility to shut down the equipment in the event of an explosion.

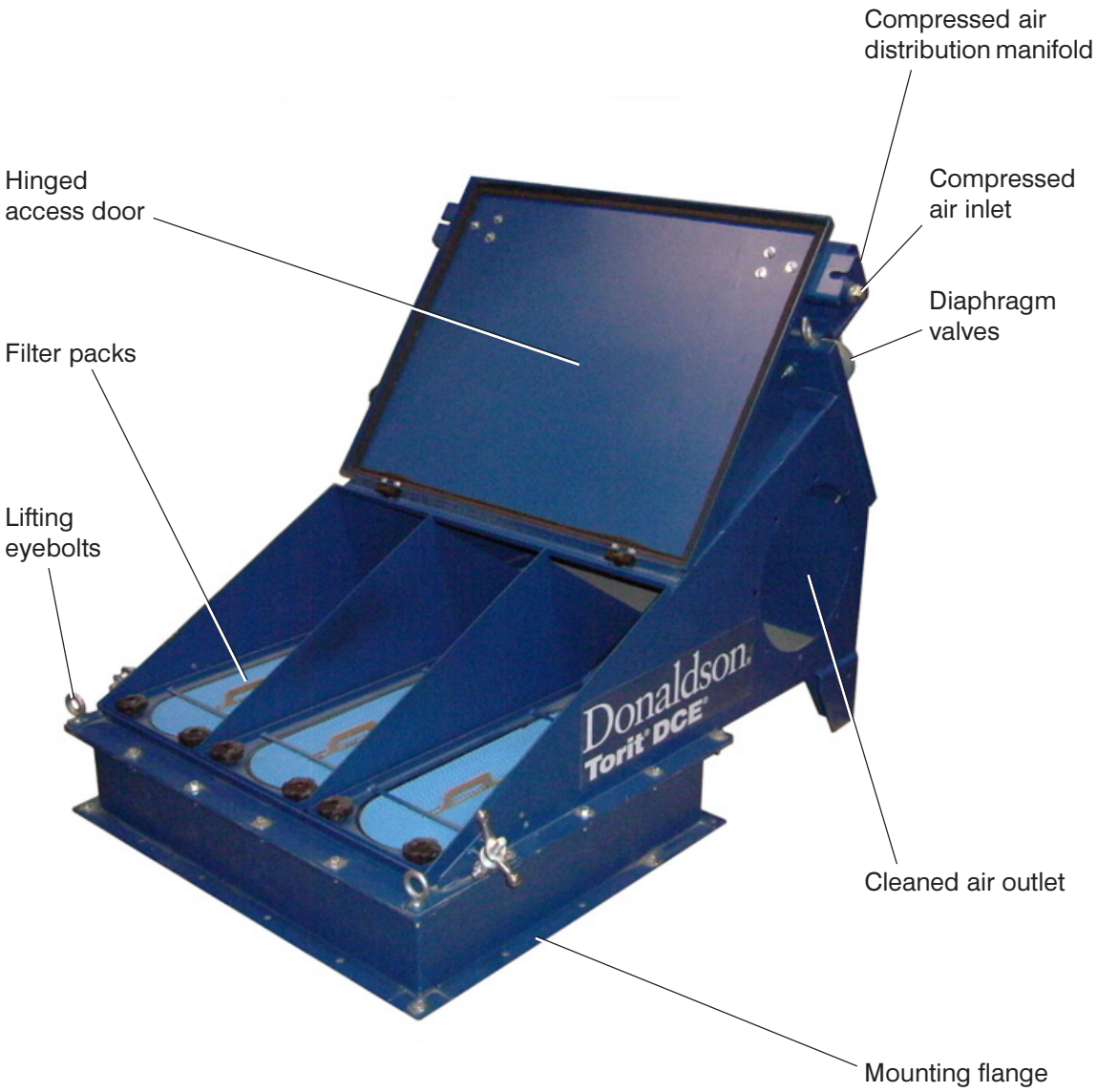


Figure 1 PowerCore dust collector
Model CPV-3 illustrated

INSTALLATION

Where equipment is installed in a Potentially Explosive Atmosphere, care should be taken not to locate or use the collector where external ignition sources can be introduced, for example stray electric currents, lightening, electromagnetic waves, ionising radiation, ultrasonic waves.

General guidance to lifting

Refer also to Figure 2

The collector should be lifted using the lifting eyebolts provided.

During all lifting operations a crane or fork lift with an adequate SWL (safe working load) must be used. (Refer to lifting label located adjacent to lifting eyebolts for weight of equipment supplied by Donaldson).

Slings with an adequate SWL (safe working load) must be used. (Refer to lifting label located adjacent to lifting eyebolts for weight of equipment supplied by Donaldson).

Use clevis connectors, not hooks, on lifting slings.

Use spreader bar to prevent damage to collector casing.

Take centre of gravity into consideration when lifting collector.

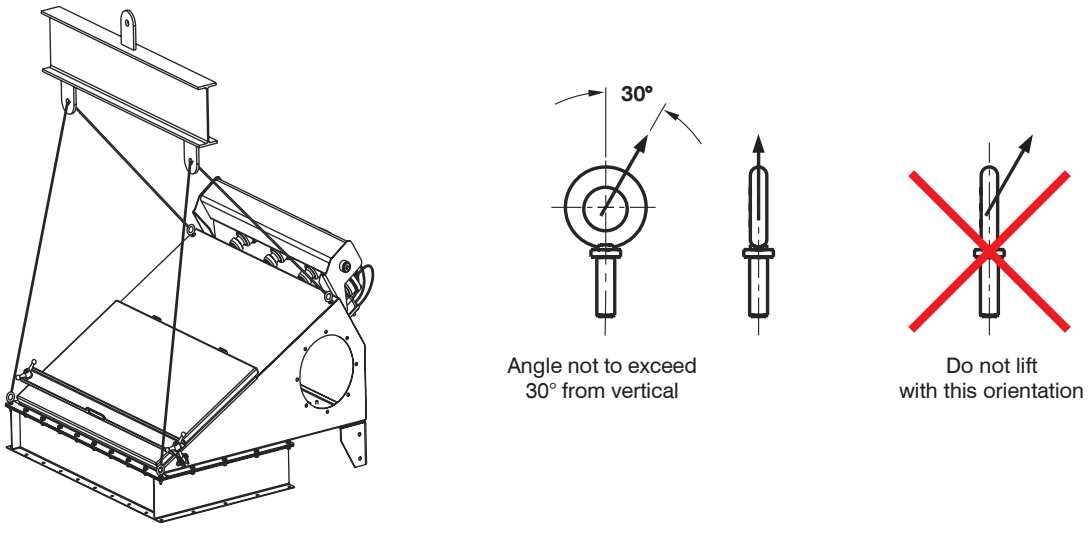


Figure 2 Four-point lifting arrangement (CPV-4 illustrated)

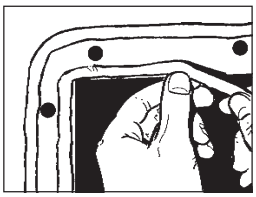
INSTALLATION

Mounting over aperture

1 Check that the aperture and fixing holes are correct in size and position to suit the mounting-flanges of the PowerCore dust collector (details of aperture and mounting flange fixing positions are provided in Publication 3010).

2 Open the access door and remove the pack of sealing strip from the clean air chamber.

Apply two continuous beads of sealing strip all round aperture, on either side of the fixing holes, as shown.



3 Following the general guidance to lifting, lift and position the collector until the mounting-flange is seated in position over the aperture. Match up fixing-holes, install bolts, washers and nuts and tighten down all round to form an airtight seal.

Fixing bolts etc. are not supplied by Donaldson.

Compressed air requirements

PowerCore dust collectors require an independent supply of clean, dry, oil-free compressed air. Details of atmospheric pressure and quantity are given in Table 3 (refer to 'Specification' section). A design label is also attached to each manifold. Where an existing factory mains system is to be used it may be necessary to install an additional moisture separator in the supply line to the collector. If a compressor is being installed to supply the collector, then the following conditions should be observed as far as possible:

Type of compressor

Use a compressor of ample capacity – an overloaded compressor tends to produce excessively contaminated, moisture-laden air.

Location of air intake

Avoid locating the air intake in an excessively polluted area and install an adequate air intake filter. The compressor air intake should be sited, if possible, on the north side of the building – fresh air drawn from the north side is usually cooler and denser, and therefore has a lower moisture content. (South of the equator the reverse will apply).

Layout and installation of air lines

The pipework between compressor and dust collector should be long enough to act as a cooling device for the compressed air. A typical requirement for the smaller installation would be 10m (30ft) of 12mm (½" NB) piping. For further details see Table 3. The piping should be installed to provide a fall in the direction of air flow to assist in the drainage of accumulated moisture. A moisture separator should be provided at the lowest point of the installation.

INSTALLATION

Pressure relief

The manifold has a maximum operating pressure of 6.2 bar (see Table 2 in 'Specifications' section). It is a requirement that adequate precaution is taken to avoid exceeding this pressure. Where a relief valve is supplied by Donaldson this device has a relief rating of 25 dm^3/s at 7.1 bar. Extra system relief will be required if the connected supply can exceed this.

Controller

It is a requirement of the Supply of Machinery (Safety) Regulations 1992 to provide adequate isolation and emergency stop facilities. Due to the varied nature of site installations this cannot be provided by Donaldson but instead is the responsibility of the customer.

Always isolate power before opening the controller.

Each CPV dust collector is supplied with an IPC (ΔP) Controller to operate the compressed air cleaning system.

CPV-2: 2-way controller
CPV-3: 3-way controller
CPV-4: 4-way controller
CPV-6: 6-way controller
CPV-8: 8-way controller
CPV-12: 12-way controller

For IPC (ΔP) Controller connections and set-up, refer to Publication 2699.

Explosion protection

When PowerCore dust collectors are supplied for use where there is a risk of explosion within the process, any protection fitted to the process should not generate pressure exceeding the strength rating of the collector. For CPV-2, CPV-3, CPV-6 and CPV-12 collectors the strength rating is 0.23 bar; for CPV-4 and CPV-8 collectors the strength rating is 0.26 bar.

Installation check list ✔

- ☐ Ensure the dust collector is securely bolted over the aperture.
- ☐ Ensure compressed air supply is installed correctly and free from leaks.
- ☐ Ensure electrical supply is installed correctly and complies to local legislation.

COMMISSIONING

It is a requirement of the Supply of Machinery (Safety) Regulations 1992 to provide adequate isolation and emergency stop facilities. Due to the varied nature of site installations this cannot be provided by Donaldson but instead is the responsibility of the customer.

Commissioning check list ✔

- ☐ Ensure the dust collector is securely bolted over the aperture.
- ☐ Open the access door(s) and ensure the seal is intact, then close and secure the door(s).
- ☐ Ensure controller is connected to the correct voltage and that the pulse interval and duration settings are correct. For 24V DC ensure polarity is correct. It is essential that the controller is earthed for both AC and DC connections.
- ☐ Ensure electric power is available.
- ☐ Ensure the compressed air manifold has sufficient protection for over-pressure.
- ☐ Start the compressor and check that the air supply is maintained at the recommended pressure.
- ☐ Switch on the controller and check that all valves operate in sequence (look and listen for exhaust pulses). As each valve operates, the air pressure reading should drop to approximately 50% of the initial setting and then return to the initial value.

If any of the above check boxes are not ticked, then the reasons why should be investigated. (Refer to fault location table in 'Maintenance' section).

Start-up sequence

Having completed all the necessary checks, the equipment may be put into operation. A typical installation should be started up as follows:

1. Start up compressed air supply.
2. Set the equipment being served, if applicable, in motion.
3. Switch on controller.

COMMISSIONING

Shut-down sequence

At the end of any period of operation it is most important that all residual deposits are cleared from the PowerCore filter packs. To achieve this, equipment should be shut down in the following order:

1 Stop the main fan, any blower or pneumatic conveying system, leaving the controller and compressed air supply switched on to allow the collector to be cleaned 'off-line'.

To enable off-line cleaning, refer to controller manual.

2 After 10-15 minutes, switch off the controller and compressor but leave the discharge equipment running to ensure that it is emptied.

3 After a further 5 minutes, switch off the discharge equipment if applicable.

Adherence to the above procedure will ensure that a PowerCore dust collector installation is maintained at optimum efficiency.

OPERATION

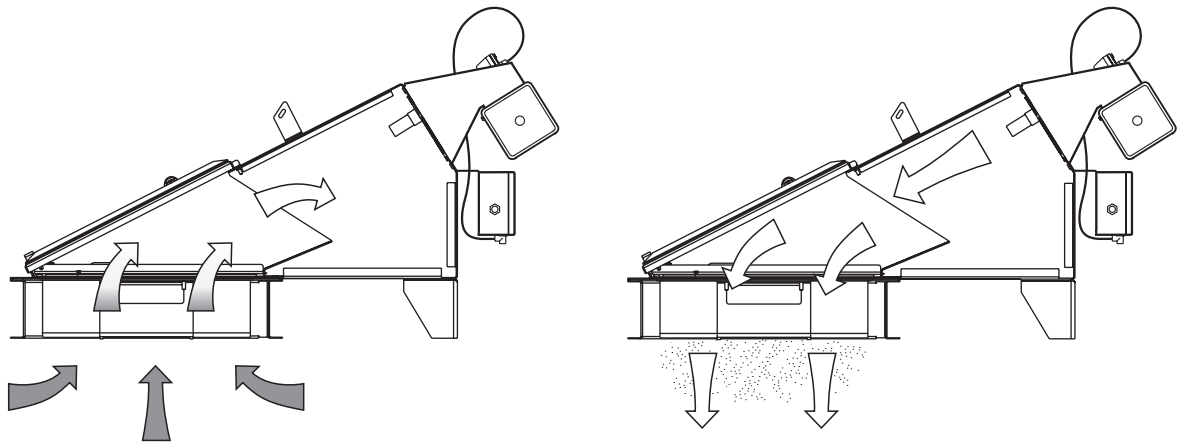
Principle of operation

Filtering operation (Fig. 3a)

With the collector mounted on the silo or storage container, dust-laden air enters the collector through the aperture at the bottom of the collector. Airflow is directed upwards through the PowerCore filter packs, removing the fine particulate (heavier particulate falls back into the process). The clean, filtered air passes through the collector and is discharged through the cleaned air outlet.

Cleaning operation (Fig. 3b)

At regular intervals, governed by the controller, each PowerCore filter pack receives a short burst of compressed air from an adjacent air diaphragm valve. This causes a brief, powerful reversal of airflow through the PowerCore filter pack, effectively dislodging the dust layer which then falls back into the process.



a Filtering operation (continuous)

b Cleaning operation (intermittent)

Figure 3 Principle of operation

MAINTENANCE

A platform should be used when carrying out maintenance where the position of the technician's feet is greater or equal to 2 metres above ground level.

Before any work is carried out, ensure the equipment is adequately isolated and safe.

Ensure the pneumatic system is fully isolated and depressurised before any work is carried out.

For ancillary equipment not manufactured by Donaldson, refer to manufacturer's instructions.

If it is unavoidable to work on the equipment while an explosive atmosphere is present, care should be taken to avoid introducing ignition sources not present during expected operation. Non-sparking tools should be used.

Access to the dirty air chamber of the equipment may create risks and hazards that under normal circumstances are not present and as such this work must be carried out by competent personnel. These risks include inhalation of dust and potential explosion hazards.

In order to maintain the original collector specification and to ensure the same level of safety, only genuine spare parts should be fitted.

Every care has been taken to avoid the risk of ignition of a flammable atmosphere. The measures taken to avoid ignition should not be altered since this may result in unsafe operation. Particular care should be taken during maintenance and component replacement to ensure the same level of safety is maintained. When replacing fan impellers, avoid any rubbing of components (to prevent mechanical sparks).

Care should be taken during cleaning and maintenance to avoid creating static discharges that have the potential to ignite a flammable atmosphere.

Routine inspection

To maintain the optimum performance of any dust collector, a routine inspection should be made to minimise down-time in the event of equipment malfunction, particularly on continuous performance applications and to ensure the equipment is maintained to its original supply condition.

Any abnormal change in pressure differential across the filter packs indicates a change in operating conditions and a fault to be rectified. For example, a prolonged stoppage of compressed air will cause an excessive build-up of dust on the filter packs, resulting in a greatly increased pressure drop.

MAINTENANCE

After the fault has been rectified, resumption of compressed air cleaning will usually return the filter packs to normal efficiency. However, it is advisable to operate the controller in still-air conditions for a short period to dislodge any accumulated dust before putting the collector into operation.

Filter pack resistance can be checked by connecting a U-tube manometer or differential-type pressure gauge to tapping points on the collector body. This will give a continuous indication of the state of the filter packs. Once running, the operating resistance will be relatively stable, the actual value depending on the air volume and the characteristics of the dust being handled.

It is recommended to periodically inspect the general casing integrity.

Do not operate above recommended compressed air pressure. Excessive pressure will reduce the working life of components.

Servicing schedule

A record of all pressure checks should be kept in a log book to aid the speedy diagnosis of faulty operation.

Weekly

1. Open the valve at the bottom of the moisture separator bowl and allow the collected water to drain off, then close the valve.
2. Connect a manometer to tapping points (refer to Routine inspection) and measure the pressure drop across the filter packs.

Monthly

Check operation of solenoid and diaphragm valves.

It may be necessary to check the operation of the valves while the system is pressurised. Care should be taken to avoid injury.

If it is found necessary to replace a diaphragm, use the following procedure (see Fig. 4):

Use service kit available from Donaldson.

1. Remove 6 mm diameter nylon tube (A) by pulling out from valve.
2. Remove the hexagon head set screws and shakeproof washers securing the valve bonnet (B).
3. The diaphragm and spring (if fitted) can now be replaced, first ensuring the ‘bleed’ hole pin is not blocked.
4. Ensure that diaphragm fits over ‘bleed’ hole pin and that the nylon sealing washer is inside throat of valve.
5. Position spring (if fitted) inside bonnet recess.
6. Refit bonnet ensuring spring (if fitted) locates over diaphragm disc shoulder and bonnet locates over ‘bleed’ hole pin.

MAINTENANCE

7 Refit and tighten the hexagonal head set screws and shakeproof washers.

8 Push-fit 6 mm diameter nylon tube back into valve.

Annually

1 Moisture separator – Isolate the compressed air supply; remove and clean the filter element.

2 Air manifold – Having isolated the compressed air supply, remove the drain plug and air inlet connections and clean out any accumulated sludge and inspect to any current local legislation.

It may be necessary to remove a diaphragm valve for internal inspection purposes.

3 Doors – Check the dust seals on all access doors for damage or ageing and ensure that they are properly seated to prevent entry of water. This is particularly important where the collector is located outside or in a wet atmosphere.

Faulty seals must be replaced.

4 Antistatic earthing (if fitted) – Check collector earthing continuity.

5 Explosion risks – Check measures taken to avoid ignition sources are still in place.

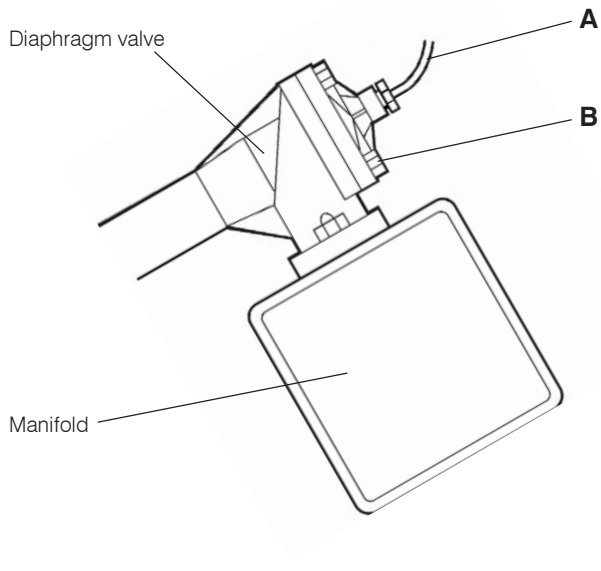


Figure 4 Valve diaphragm replacement

MAINTENANCE

Filter pack replacement

Use safety and protective equipment when removing contaminants and filter packs.

Dirty filter packs may be heavier than they appear.

Use care when removing filter packs to avoid personal injury.

Do not drop filter packs.

Refer also to Figure 5.

1 Turn off and isolate any air movement equipment associated with the process (e.g. fan) and check clean air chamber is at atmospheric pressure.

2 Turn off controller and/or compressed air supply.

3 Open access door by releasing fasteners. Swing door fully open and engage door locking mechanism.

4 Release filter pack retainer wing nuts and remove filter pack retainers.

5 Remove each filter pack by lifting straight up.

6 Insert new filter packs into place.

7 Install filter pack retainers and tighten wing nuts so that each filter pack gasket is seated firmly.

8 Disengage access door locking mechanism, then close and fasten access door.

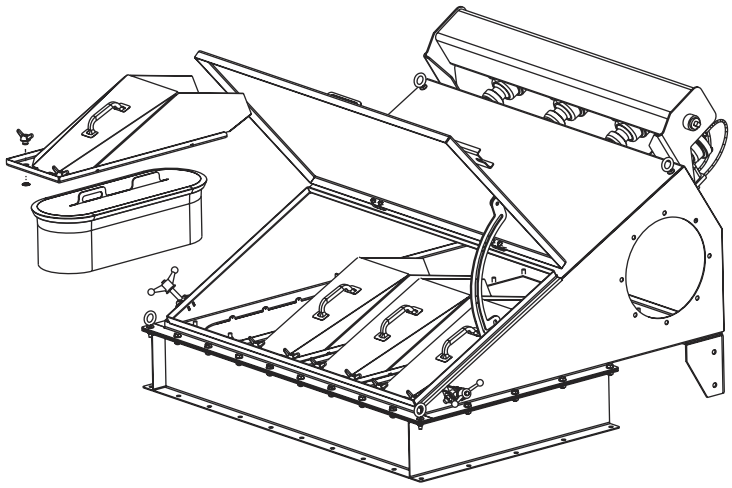


Figure 5 Filter pack replacement (CPV-4 illustrated)

MAINTENANCE

TABLE 1 – FAULT LOCATION

Symptom	Possible cause	Action
1 Excessive pressure differential.	1.1 Compressed air malfunction.	a If compressor stopped, rectify compressor fault; check interlocks; check motor and supply; check drive. b If compressor OK, check pulses at manifold pressure gauge. c Clean filters, dismantle and clean moisture separator. d Check for excessive water or oil in compressed air supply, and possible accumulation in manifold.
	1.2 No pulses of air to valves.	a Refer to 'Fault location' table in controller manual supplied with dust collector.
	1.3 Filter packs blocked.	a Run filter packs clear*, then remove each filter pack in turn and renew any that are damaged.
2 Insufficient airflow.	2.1 Filter packs blocked.	a Run filter packs clear*, then remove each filter pack in turn and renew any that are damaged.
3 Visible effluent in clean air outlet.	3.1 Filter packs not properly sealed.	a Ensure filter pack retainers are fitted securely.
	3.2 Damaged filter pack.	a Damaged filter packs can be identified by the dust present in clean air chamber. Withdraw filter pack and renew.

*To run filter packs clear, allow the controller to perform several complete cleaning cycles before switching off compressor etc.

SPECIFICATION

For other specifications on this product refer to Publication 3010.

For controller specifications refer to Publication 2699.

TABLE 2 – COMPRESSED AIR MANIFOLD DESIGN DETAILS

Design pressure:	6.9 bar (100 psig)
Maximum operating pressure, PS:	6.2 bar (90 psig)
Test pressure:	10.35 bar (150 psig)
Design temperature:	−30° to +150°C
Maximum rating of pressure relief device:	25 dm^3/s at 7.1 bar (factory set at 7.1 bar) (not supplied as standard)
Manifold volume:	7 litres (CPV-2) 12 litres (CPV-3 and CPV-6) 17 litres (CPV-4 and CPV-8) 27 litres (CPV-12)
Product of pressure and capacity:	43.4 bar litres (CPV-2) 74.4 bar litres (CPV-3 and CPV-6) 105.4 bar litres (CPV-4 and CPV-8) 167.4 bar litres (CPV-12)
Material used for manifold construction:	Structural hollow section
Minimum metal thickness before manifold requires special inspection:	To improve corrosion resistance the manifold is painted externally and internally using cathodic electrocoat. 5.5 mm

1 bar = 10^5 Pa

SPECIFICATION

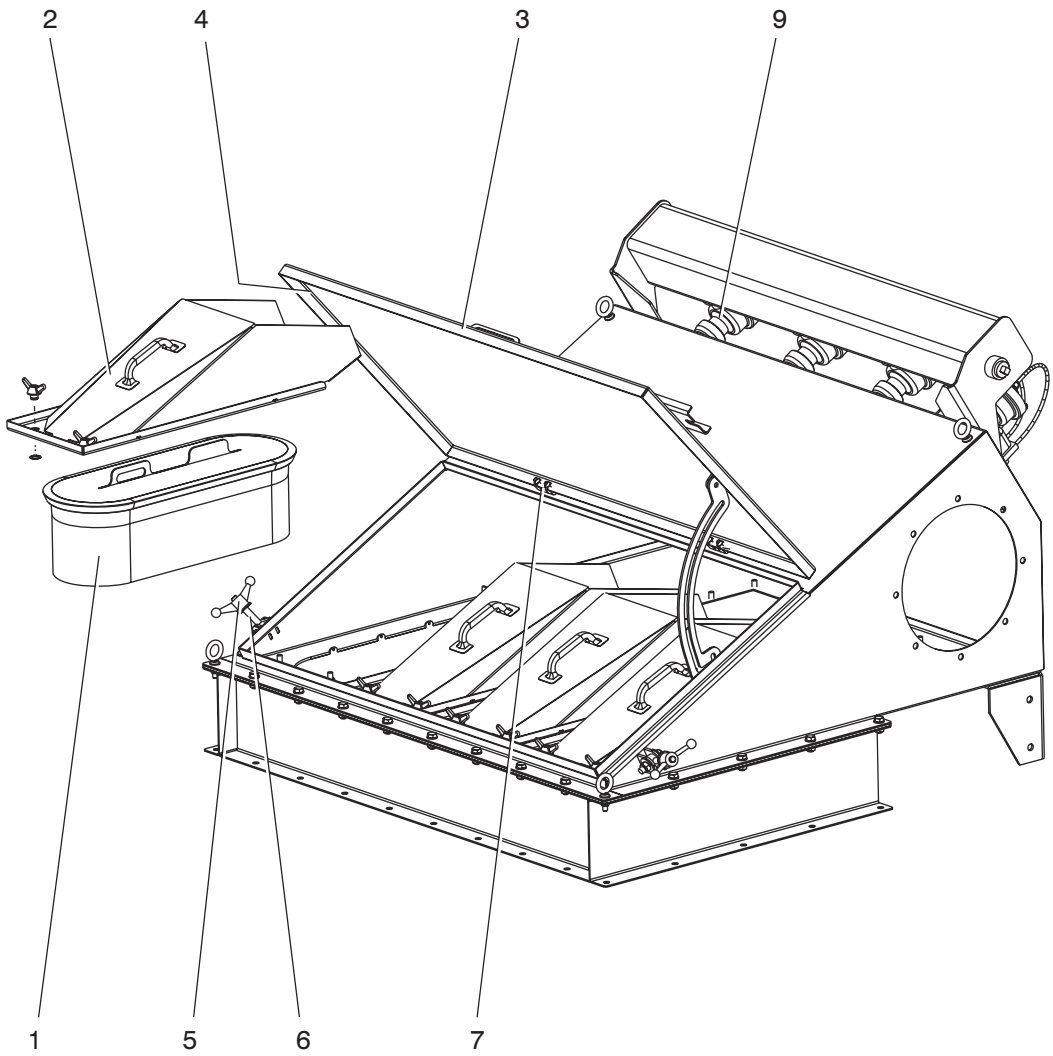
TABLE 3 – COMPRESSED AIR REQUIREMENTS

Collector type	Working compressed air pressure [a]		Atmospheric air volume – F.A.D. at 12 sec. intervals [b]		Pulse duration	Minimum pipe diameter [c]
CPV-2	6.2 bar	90 psig	10 m^3/h*	5.9 cfm*	100 ms	½" NB (12)
CPV-3	6.2 bar	90 psig	16 m^3/h	9.4 cfm	100 ms	½" NB (12)
CPV-4	6.2 bar	90 psig	20 m^3/h*	11.8 cfm*	100 ms	½" NB (12)
CPV-6	6.2 bar	90 psig	16 m^3/h	9.4 cfm	100 ms	½" NB (12)
CPV-8	6.2 bar	90 psig	25 m^3/h*	14.7 cfm*	100 ms	½" NB (12)
CPV-12	6.2 bar	90 psig	25 m^3/h	14.7 cfm	100 ms	½" NB (12)

[a] Normal operating pressure. [b] Recommended initial setting; this may be varied with experience.
[c] Sizes suitable for runs of pipe up to 30 m (100ft) in length. For longer runs consult with Donaldson.
*Estimated data.

1 bar = 10^5 Pa

SPARE PARTS



CPV-4 illustrated

Figure 6 Spare parts identification

Item	Description	Part number	✳
	Filter pack assembly		
1	Filter pack, Ultra-Web	P032422	✔
2	Filter pack retainer	AD 382 6701	
	Access door assembly		
3	Access door CPV-2 CPV-3 CPV-4 CPV-6 CPV-8 CPV-12	AD 383 6206 AD 383 2103 AD 381 3903 AD 383 6801 AD 383 5204 AD 382 6805	
4	Door seal	334 1209	✔
5	Door fastener	AD 382 9701	
6	Eyebolt, door fastener	282 4500	
7	Door hinge	759 6101	
	Controller		
8	For controller spares information refer to Publication 2699 – item not illustrated		
	Compressed air assembly		
9	Diaphragm valve	1A 3189 9011	
10	Diaphragm valve service kit – item not illustrated	1A 2565 3204	✔
11	Gasket, diaphragm valve – item not illustrated	1A 3189 0049	✔

✳ Recommended spares for up to two years' operation

Damaged safety related parts and safety components should be replaced only with genuine original spare parts otherwise CE mark will become invalid

DECLARATION OF CONFORMITY

GB

EC DECLARATION OF CONFORMITY

(Machinery directives 98/37/EEC)

Head Office:	**Donaldson Europe B.V.B.A.** Interleuvenlaan 1, B-3001 Leuven (Heverlee), Belgium
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Customer Service Centre:	**Donaldson Europe B.V.B.A.** Pathoekeweg 166, B-8000 Brugge, Belgium
Description of the machinery:	**Dust Collector**
Brand:	**Donaldson Torit DCE**
Description:	See attached **Scope of Delivery**

The undersigned, authorized by Donaldson, certifies that the machine described above, provided that it is installed, maintained and used in accordance with the instructions for use and the codes of practice, meets the essential safety and health requirements of the following Directives:

- Machinery directives 98/37/EEC
- Low voltage directive 2006/95/EC
- Pressure equipment directive 97/23/EC
- Electromagnetic compatibility directive 89/336/EEC
- Equipment and protective systems intended for use in Potentially Explosive Atmospheres 94/9/EC

IMPORTANT! Read the Installation, Operation and Maintenance Manual before using this machine. If you require additional copies contact your local Donaldson representative.

The machinery must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the above mentioned directives.

Signature:

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Date: March 2007

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